Retrievals of fine mode light absorbing particles from POLDER/PARASOL polarized observations over East and South Asia

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A new aerosol composition approach that can infer aerosol composition fractions from satellite observations was developed and incorporated in Generalized Retrieval of Aerosol and Surface Properties algorithm [1]. In this study, the aerosol composition approach was used to obtain the temporal and spatial characteristics of fine mode light absorbing particles (black carbon, brown carbon) over East and South Asia (ESA) from POLDER/PARASOL polarized observations during the period 2005–2013. The inter-comparisons of measured and retrieved BC in China show a reasonably good agreement for both monthly averaged and daily values. The distribution of light absorbing carbon (BC and BrC) has a significant temporal variation cycle that they are enriched in the months when the biomass burning or fossil fuels combustion are strong. We find that BC particles mainly concentrate on the region where is near to the fires or anthropogenic emissions, however, BrC particles predominantly concentrate on the ocean or land region where is far to the fires or anthropogenic emissions. Seasonal averaged BC/(BC+BrC) ratios in ESA are also presented. High ratios (more than 0.5) in Northeast India and North China during the DJF season are attributed to the fossil fuels combustion and strong anthropogenic emissions. Medium ratios (around 0.2–0.3) over the Indo-China Peninsula and Northeast China during the MAM season are associated with the biomass burning aerosols resulting from the forest fires. The observationally-based temporal and spatial distributions of BC, BrC, and BC/(BC+BrC) ratios are retrieved directly from satellite observations for the first time in ESA.

Reference

[1] Li, L., O. Dubovik, Y. Derimian, *et al*., 2019: Retrieval of aerosol composition directly from satellite and ground-based measurements. *Atmos. Chem. Phys. Discuss*., https://doi.org/10.5194/acp-2019-208.

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